CURRENT LITERATURE

BOOK REVIEWS

The oxidases

KASTLE[1] has recently published a monograph on oxidases and other oxygen catalysts concerned in biological oxidations. The work is a compilation of our present knowledge concerning oxidases and other oxygen catalysts, as well as an excellent historical résumé of the subject. The constantly growing recognition of the important rôle of oxidases and related oxygen catalysts in biological processes, as well as the rapidly growing literature on the subject, makes a summary of the real contributions especially valuable at the present time.

The first chapter deals with the important past and present theories of oxidation, beginning with SCHOENBEIN'S ozone theory. After a brief discussion of this theory, the author proceeds with a more detailed account of VANT' HOFF'S theory of ionization, HOPPE SEYLER'S nascent hydrogen theory, and the peroxid theory of TRAUBE, ENGLER, and BACH. The conception which involves an exchange of electrical potential in oxidations, however, is not mentioned.

The second chapter takes up the oxidizing ferments, and begins with a discussion of their rôle and range in biochemical processes. This is followed by a detailed account of the guaicum reaction, since our first knowledge of oxidizing ferments is so closely associated with the reaction. The historical treatment of oxygen exciters and oxygen carriers is divided into two periods. The first covers the first sixty years of the nineteenth century, with SCHOENBEIN'S contributions standing out as the most important. He supposed that by means of various substances and under various influences the oxygen of the air becomes ozonized. These substances may in turn combine with ozone thus produced to form an active ozonid, which in turn can give up its oxygen to other less readily oxidizable substances. Thus the presence of oxygen activators and carriers was recognized, and the most important characteristics of oxidases and peroxidases discovered, although up to this time these terms had not been introduced into science.

During the second historical period, the contributions of TRAUBE and BERTRAND are especially emphasized. TRAUBE in his *Theorie der Fermentwirkungen* (1858) established the chemical entity of oxidizing ferments and their importance in acting as chemical go-betweens between free or combined oxygen

[1] KASTLE, J. H., The oxidases and other oxygen catalysts concerned in biological oxidations. U.S. Public Health and Marine Hospital Service, Hygienic Laboratory, Bull. 59. 1909.

and the fermentable substances. To BERTRAND we owe the introduction into science of the term oxidase. The adoption of this general term was based upon the discovery and characteristics of laccase and tyrosinase. The chapter concludes with a classification of oxidases and special reference to the sources, preparation, and characteristics of laccase, tyrosinase, aldehydase, and the purin oxidases.

The third chapter is devoted to the peroxidases and catalases. The weight of opinion is inclined to the conception that peroxidases are substances capable of forming unstable peroxids from hydrogen peroxid, by double decomposition or by combining directly with the hydrogen peroxid to form unstable holoxid (TRAUBE) derivatives, possessing greater powers of oxidation than hydrogen peroxid.

BACH and CHODAT'S conception of an oxidase consisting of a mixture of peroxidases and peroxid-forming substances (oxygenases) would make the peroxidases the more important agents in plant and animal oxidations, and would relegate the oxidases to an insignificant position in such oxidations, if indeed they function as enzymes at all. In the author's opinion the objections which have been recently urged against the true enzymatic nature of oxidases are well taken.

A considerable amount of evidence is brought together to show the importance of iron, copper, and manganese as coenzymes to oxidizing ferments. According to BERTRAND, manganese is the really active element of the oxidases, so far as the activation and transfer of oxygen is concerned. EULER and BOLIN have found that laccase has no action on hydroquinone in the absence of manganous salts, and therefore they suggest that laccase owes its activity to the presence of such salts. In this connection it is interesting to note that in a paper by BACH,[2] more recent than the above monograph, he claims to have obtained a tyrosinase which will oxidize tyrosin to the red stage and is free from both iron and manganese. He concludes, therefore, that manganese and iron salts are in no way necessary for oxidase activity. One of the most valuable features of the monograph is the comprehensive list of references to the literature.—CHARLES O. APPLEMAN.

Colloidal chemistry

The newer plant physiology should welcome the appearance of FREUNDLICH'S book[3] on colloidal chemistry, or capillary chemistry, as he terms it. This is the first attempt to bring together our knowledge of this youngest and most difficult branch of physical chemistry. It puts the physiologist immediately in touch with the present status and most important literature of a subject which seems destined to play at least as important a rôle in the study of vital phenomena as

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[2] BACH, A., Zur Theorie der Oxidasewirkung. Ber. Deutsch. Chem. Gesell. **43**:362. 1910.

[3] FREUNDLICH, HERBERT, Kapillarchemie, eine Darstellung der Chemie der Kolloide und verwandter Gebiete. 8vo. pp. viii + 591. *figs.* 75. Leipzig. 1909.